

# Assimilation of satellite altimeter data with a four dimensional model of the Japan Sea

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Topic: Ocean dynamics

A data assimilation is carried out to detect the variability of the Japan Sea circulation in the range from a few days to several years and from eddy to basin scale. The model applied in this study is the same 1/6 degree GFDL MOM1 as Kim and Yoon (1999) but is driven by ECMWF daily wind stress, heat and fresh water fluxes. The satellite altimeter data of TOPEX/POSEIDON, ERS-1 (phase C and G) and -2 are assimilated by an approximate Kalman filter (Fukumori and M.Rizzoli, 1995). The approximation is made by seeking an asymptotic steady error covariance matrix (Fukumori et al., 1993) and by introducing a coarser grid model for the innovation (data-model misfit). The coarse grid model is defined on 1/2 degree horizontal resolution and consists of the barotropic stream function, first baroclinic displacement and velocity amplitudes.

The assimilated estimates explain about 6cm sea level variability of the data (~12cm in the southern part), which is much larger than the previous reduced-gravity model and TOPEX/POSEIDON altimeter data assimilation (Hirose et al., 1999). The impacts of the T/P and ERS data on the filtered estimates are comparable. The result also shows high correlation to subsurface water temperatures measured by CTD. Many of the mesoscale eddies/disturbances travel east-northeastward with the advection speed of 1-3cm/s though most of them generated in the western region can not pass over the Oki Spur. The quasi-biennial variability found by Hirose and Ostrovskii (1999) did not show clear propagation pattern. The shallow Oki Spur may work as a "western boundary" to this signal. This is more plausible estimation than by the R-G model which has no bottom topography.